

Various attempts have been made to provide a ball mount that can be rotated from a towing position to a retracted position such as shown in U.S. Patent 4,807,900 to Tate in which he provides a horizontal rotatable draw plate carrying a ball. None of the art has addressed the pivoting of the conventional hitch receiver with a removable ball mount member mounted therein from an operating extended position to a retracted stored position as shown herein. Various attempts have been made to provide a pivoted and extendible ball mount member to facilitate hitching up. Included in this category are patents 5,322,315 to Carsten; 4,951,957 to Gullickson; 5,547,210 to Dugger. My US patent 6,527,292 issued Mar. 4, 2003 addressed the first part of the above problems and this application is in part an improvement of my said patent and is based in part on my Provisional Application 60/449,353 filed February 24, 2003.

OBJECTS AND SUMMARY OF INVENTION

Accordingly it is an object of the present invention to provide a pivotally mounted hitch receiver for standard ball mount tow bars that can be easily moved from towing position to stored position with an easily extendable ball mount member to facilitate hitching up.

It is another object of the present invention to provide a pivotally mounted hitch receiver capable of safely engaging large size tow bars such as classes 3, 4, 5, and larger.

It is a further object of the present invention to provide a hitch receiver for classes 3, 4, 5 and larger with an extendable ball mount member that may be easily moved from stored position to hitching up position to towing position with complete safety.

It is a still further object of the present invention to provide class 4, 5 or larger hitch receiver that is simple and economical to manufacture, safe and easy to use, and in stowage mode positions a ball mount in a fully retracted position so that it can not be contacted accidentally by a person's legs as they walk behind a vehicle.

These and other and further objects are accomplished in an embodiment of the present invention in which a hitch receiver is hingedly mounted between a pair of horizontal plates for pivotal movement from a rearward facing position to a side facing position.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an exploded perspective view of a hitch receiver and ball mount member according to the present invention;

Figure 2 is a top plan view of the apparatus of Figure 1 with the top plate removed and shown in the locked towing position;

Figure 3 is a view similar to Figure 2 showing the hitch in the stowed position;

Figure 4 is a view similar to Figures 2 & 3 showing the hitch in the extended, pivoting position for hitching up;

Figure 5 is a view similar to Figure 2 of another embodiment of the present invention; and

Figure 6 is a block diagram of a control system for the apparatus of Figure 5.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to Figure 1 there is shown an exploded view of a ball mount 10 positioned in a hitch receiver 12 mounted between plates 14 and 16 on a frame member 18 adapted to be installed on the underside of a pickup truck or other vehicle. Ball mount 10 carries the usual hitch ball 20 on its outer end and the bar member 22 of the ball mount is sized to telescopically fit within receiver 12. A pair of transverse holes 24 are provided in the sides of receiver 12 and a corresponding hole 26 in bar member 22 is provided adjacent the outer end of ball mount 10. The holes 24 and 26 are positioned so as to align when the ball mount 10 is in operative or stored position within receiver 12. A linchpin 28 is inserted through the assembled ball mount and receiver to secure same for towing or storage in the retracted position. A suitable lock (not shown) may be provided to keep linchpin 28 in proper position.

Receiver 12 is pivotally mounted between plates 14 & 16 by a vertical bolt 42 and corresponding holes 44 in the top and bottom of receiver 12. This allows receiver 12 to pivot freely between plates 14 & 16 from left to right as necessary to position the ball mount in hitching-up position with the trailer to be towed. Bolt 42 is threaded on the end and inserted from underneath plate 16 through a hole 46 into a threaded hole 48 in top plate 14.

Ball mount member 10 has formed therein a longitudinal slot 49 extending from adjacent the outer end to adjacent the distal end. Bolt 42 is fed through this slot to allow the ball mount bar member 22 to telescope into and out of the receiver 12. A stop limit bar 50 is formed at the distal end of ball member 10 closing slot 49 in bar 22 to prevent the complete removal of the member 10 from the receiver 12 without first removing bolt 42. A recess or fork 60 is formed in the distal end of ball mount member so as to engage an aligning and locking bolt or stud 62 fixed to plates 14 and 16 so that when the ball mount member 10 is retracted into receiver 12 the stud 62 fits into the recess 60 to align the ball mount and receiver in towing position (see Figure 2). In this position holes 24 in the receiver and holes 26 in the ball mount are aligned. A pin 28 inserted in the aligned holes thus locks the ball mount and receiver in towing position after the desired trailer has been hitched up.

Similarly a second bolt or stud 66 is fixed on the left side of plates 14 and 16 in Figure 1. As shown in Figure 3 when it is desired to store the hitch assembly out of the way in the retracted position pin 28 is removed and the ball mount member is withdrawn slightly and the assembly rotated to the right until the ball mount is retracted out of the way under the bumper or body of the towing vehicle. Ball mount

member is then inserted all the way into the receiver 12 so that recess 60 engages about stud 66 to hold the assembly in the retracted position. Installation of pin 28 in aligned holes 24 and 26 then locks the hitch assembly in the retracted and stored position.

As shown in Figure 4 for hitching-up purposes the pin 28 is removed and the ball mount withdrawn and with the receiver rotated to the appropriate position for receiving the trailed hitch member. It thus is not necessary to perfectly align the towing vehicle and the trailer in order to hitch up. Once the trailer is engaged the vehicle pulls ahead to align the two vehicles and then backs up until the ball mount engages stud 62. The assembly may be locked up in towing configuration by inserting pin 28 in the appropriate holes 24 and 26.

Referring now to Figure 5 ball mount member 10' is telescoped into receiver 12'. Receiver 12' is pivotally mounted between the lower plate 16' and the top plate 14, (shown for clarity) by a bolt 42'. Ball mount member 10' is formed with an open fork end 80 opposite the ball end and a groove 82 extending from adjacent the fork end 80 to adjacent the ball end. Fork end 80 has a length sufficient to allow the end of ball mount member 10' to extend past pin 42' almost to the frame member 18' when inserted into receiver 12' to the full retracted and towing position. A pin not shown is fixed on top plate to engage in groove 82 to prevent unwanted disassembly of ball mount 10' from receiver 12'. Pin 28' inserted in holes 24' and 26' maintains ball mount member 10' in receiver 12' in a similar manner as shown in Figure 1.

Mounted on either side of the front end (relative to the towing vehicle) of ball mount member 10' on frame member 18' are a pair of sensor members 84 and 86. Members 84 and 86 are spaced apart sufficiently to allow a little pivotal movement of the fork end of the ball mount member 10' when the towed vehicle starts to fish tail. Housings 84 and 86 serve as stops to limit travel of the fork end and have mounted therein a normally open switch member 88 and 90 respectively.

Switches 88 and 90 are connected to a controller 92 as shown in Figure 6. Controller 92 is also connected via the usual trailer connectors to the brake actuating solenoids 94 and 96 of the usual electric brake members of most trailers.

In operation when the ball mount member 10' is locked in towing position, as the towed vehicle starts to the right for instance in Figure 5, the ball mount member 10' will be pivoted clockwise until switch 90 is actuated. Further pivoting is limited by housing 86. If the towed vehicle is fishtailing the above movements will quickly be reversed and ball mount member 10' will actuate switch 88. An adjustable timing circuit in controller 92 monitors the time between signals from switches 88 and 90 and if they are

occurring within a preset period of time controller 92 will cause one or both brake solenoids 94 and 96 to be actuated to slow the towed vehicle and allow the towing vehicle to straighten out the fish tailing action.

When not being used to tow a vehicle ball mount member 10' is pivoted to the right in Figure 5 and the fork end 80 engaged about pin 98 and pin 28' inserted in the usual holes to fix the hitch assembly in the retracted position similar to that shown in Figure 3.

In both embodiments of Figs 1 & 5 the hitch may be locked in either operative or stowed position by simple insertion of the traditional linch pin, common in trailer hitches. into the aligned holes of the receiver and ball mount members. This allows a simpler and more economical construction and results in a hitch assembly that is complete and available for instant use even when stored out of the way under the bumper of the towing vehicle.

While there are given above certain specific examples of this invention and its application in practical use, it should be understood that they are not intended to be exhaustive or to be limiting of the invention. On the contrary, these illustrations and explanations herein are given in order to acquaint others skilled in the art with this invention and the principles thereof and a suitable manner of its application in practical use, so that others skilled in the art may be enabled to modify the invention and to adapt and apply it in numerous forms each as may be best suited to the requirement of a particular use.